Superfund Program
Proposed Plan

U.S. Environmental Protection Agency, Region II

SDMS Document
113260

Martin Aaron Superfund Site
July 2005

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred alternatives for addressing contaminated soils and groundwater at the Martin Aaron Superfund site, and provides the rationale for those preferences.

The U.S. Environmental Protection Agency's (EPA's) Preferred Alternative for soils is Alternative S4, excavation, transportation and disposal of contaminated soils containing volatile organic compounds (VOCs) and that act as a continuing source of groundwater contamination, and arsenic-contaminated soils associated with site releases. The excavated soil would be treated, if necessary, prior to land disposal. Residual soil contamination that remains on the site would be capped on site utilizing asphalt or similar material. Institutional controls such as a deed notice would be employed to ensure that future site use would not disturb the capped soils.

The Preferred Alternative for groundwater is Alternative G5, groundwater collection, on-site pretreatment, with discharge of the treated water to the publicly owned treatment works (POTW).

The Martin Aaron site was the location of a number of drum reconditioning facilities that operated out of 1542 South Broadway in Camden, New Jersey, and covers approximately 2.4 acres. The scope of EPA's investigation included that property and a number of neighboring properties, including 1535 South Broadway, which is owned by the South Jersey Port Corporation (SJPC). The SJPC property is approximately 3.6 acres in size and was included in EPA's Remedial Investigation since it was at one time leased by Martin Aaron, Inc. EPA and New Jersey Department of Environmental Protection (NJDEP) have reviewed the conditions at the SJPC property and mutually agreed to address this property separately from the Martin Aaron Superfund site. As discussed in more detail later in this Proposed Plan, NJDEP assumed the responsibility for addressing the conditions found at the SJPC property.

This Proposed Plan includes summaries of all cleanup alternatives evaluated for use at this site. This document is issued by EPA, the lead agency for site activities, and NJDEP, the support agency. EPA, in consultation with NJDEP, will select a final remedy for contaminated soils and groundwater at the site after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the Preferred Alternatives or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its community

Dates to remember:
MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
July 15 - August 15, 2005
U.S. EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
July 26, 2005
U.S. EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at Camden County Municipal Utilities Authority Auditorium, 1645 Ferry Avenue, Camden, New Jersey at 7:00 p.m.

For more information, see the Administrative Record at the following locations:

U.S. EPA Records Center, Region II
290 Broadway, 18th Floor.
New York, New York 10007-1866
(212) 637-3261
Hours:
Monday thru Friday - 9 am to 5 pm

Camden Free Public Library
418 Federal Street
Camden, New Jersey 08103
(856) 757-7640
Hours:
Monday thru Friday - 9 am to 5 pm

relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation and Feasibility Study (RI/FS) reports and other documents contained in the Administrative Record file for this site. EPA and NJDEP encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted at the site.

SITE HISTORY

Records indicate that the Martin Aaron parcel has been used for light industrial activities since at least 1886. Until at least 1940, various hide tanning, glazing, and related operations were performed on this and neighboring lots. In 1968, Martin Aaron, Inc., purchased the property, and is currently the owner of record. From 1968 to 1987, Martin Aaron operated a drum recycling business. In 1985, Westfall Ace Drum Company (WADCO), also known as Drum Services of Camden, began operating at the site. Rhodes Drums, Inc., also operated at the site from around 1985 until it ceased business in 1998. WADCO occupied the main on-site building (the Martin Aaron building), while Rhodes Drums operated from a smaller building in the southeastern corner of the property (Rhodes Drums building). WADCO was liquidated in bankruptcy proceedings in 1994.

Martin Aaron, WADCO and Rhodes Drums would arrange for removal of used drums from businesses for a fee and transport the drums to the site for reconditioning. EPA has learned that the drums contained residues of material, including hazardous substances. The drums were drained of residue, pressure-washed with a caustic solution, water-washed, rinsed, steam-dried and repainted.

In 1987, NJDEP, under a search warrant issued by the Department of Law and Public Safety, collected samples from buried drums exposed in test pits, sludge from sewer basins, soils, and effluent samples. The results confirmed the presence of hazardous waste in drums and elevated levels of metals in soil above appropriate NJDEP criteria. Sludge and effluent samples from sewer basins contained elevated VOCs and metals. Interviews with employees indicated that drum residues were allowed to drain into the ground and that drums containing wastes from the cleaning process were also buried on site. Also, NJDEP determined that a portion of the residual material generated from the drum cleaning operations drained into basins that emptied directly into the ground. Execution of the search warrant led to the indictment and conviction of one of the operators of the site, Martin Aaron, Inc. and its president, Martin Aaron, on charges of improper disposal of hazardous waste.

In 1997, NJDEP initiated an RI, using state funds, for both soil and groundwater to determine the nature and extent of contamination at the Martin Aaron site. NJDEP's investigation activities included site mapping, a geophysical investigation to identify buried drums, a stability investigation of the buildings, and extensive soil and groundwater sampling. Investigations were conducted primarily at the Martin Aaron property and at the SJPC property. Over 160 soil borings were installed to identify the areal extent of soil contamination. Sampling was conducted in and around potential contaminant source and disposal areas, and in sewer basins and other areas of potential contaminant migration. Surface and subsurface soil samples were collected inside and outside of buildings on the property, in underground storage tank (UST) areas, test pits and trench excavations. Groundwater samples were collected from monitoring wells and the nearest municipal supply well.

The NJDEP RI soil results showed that both surface and subsurface soil contamination was widespread throughout the Martin Aaron property and extend beyond property lines. Contaminants included chlorinated and aromatic VOCs, semi-volatile organic compounds (SVOCs) consisting mostly of poly-aromatic hydrocarbons (PAHs), metals, pesticides and polycyclic-chlorinated byphenyls (PCBs). The RI also found groundwater contamination in both shallow and some of the deeper monitoring wells installed on the property.

After the operators failed to respond to numerous directives issued by NJDEP to clean up the site, NJDEP conducted several interim remedial measures from 1995 to 1999. NJDEP removed soil, 700 drums of chemical wastes, 10,000 empty drums, dumpsters filled with mixed wastes, and underground storage tanks. Additionally, in 1998, the City of Camden demolished the Martin Aaron building, the main building used for drum reconditioning operations, because it was in danger of collapsing.

The site was placed on the National Priorities List in 1999, and EPA became the lead agency for the Martin Aaron site. EPA took additional removal actions, ending in 2001, to remove empty and full drums of waste that were abandoned outside the Rhodes Drums building. EPA also removed 68 drums of hazardous waste, hundreds of empty

drums, several buried drums, storage tanks, and a limited amount of contaminated soil and debris from the vicinity of the Rhodes Drums building. The property was also fenced to prevent trespassing.

ENFORCEMENT

From 1981 to 1995, NJDEP and EPA issued numerous Notices of Violations, Administrative Orders and other enforcement actions against the operators of the site. Violations included unpermitted discharges of hazardous waste, non-notification of spills or releases, improper storage of waste drums, improper waste handling and disposal, improper labeling of hazardous waste containers, hazardous waste storage violations, and others.

EPA issued letters to Martin Aaron, Inc., and Rhodes Drums in 1999 and 2000, respectively, notifying them that they were potentially responsible parties (PRPs) liable for payment of response costs for cleanup of the site. After evaluating these entities, EPA concluded that they lacked the financial resources to fund or perform the RI/FS.

In 2003 and 2004, EPA identified a number of additional companies as PRPs for the site. These companies, known as generators, were customers of the operators of the drum reconditioning facilities. Site operators would purchase empty drums from the generators, clean and recondition the drums at the site, and sell the reconditioned drums to generators and others. The drums contained residues of chemicals, including hazardous substances, which were improperly disposed of at the site. EPA has notified the generators that they are considered PRPs for the site.

SITE CHARACTERISTICS

The area surrounding the site is an urban mixture of industrial and residential uses, with some vacant lots. The Martin Aaron property is currently zoned for commercial use. The property consists of a fenced 2.4-acre parcel with one remaining building formerly occupied by Rhodes Drums. The property is covered with vegetation and the remains of the former building foundations.

There are no known drinking water or industrial production wells near the Martin Aaron site or the surrounding properties. Camden County Municipal Utilities Authority (CCMUA) provides drinking water to the City of Camden using water supply wells. CCMUA provides drinking water to approximately 105,000 people. The nearest CCMUA well is located approximately 1.75 miles east-northeast of the site. This well (City Well #7) is used as an emergency water supply well only.

Given the extensive NJDEP investigation, the scope of EPA's field investigations were meant to supplement the already available data and fill data gaps. Response actions during 1999 to 2001 were performed partly in response to NJDEP's RI results, and resulted in considerable changes in conditions at the site, with the removal of known soil hot spots, along with USTs, above-ground tanks, piping and process equipment. In addition to documenting the conditions after the removal action, EPA's study evaluated data gaps on neighboring properties, collected data that could be used for a human health risk assessment, and completed the groundwater investigation initiated by NJDEP.

EPA's RI included areas identified as the Martin Aaron property, the SJPC property, the scrap-yard (north of the Martin Aaron property), Comarco Products (a food processing facility to the south), the Ponte Equities property (unoccupied warehouse buildings, also to the south), and various properties and right-of-ways on Everett, Sixth, and Jackson Streets. (Refer to Figure 1.)

A review of property records for this section of Camden identified large tracts that required landfilling prior to development. The entire Martin Aaron study area was the subject of this type of landfilling, beginning in the 19th century. Subsequently, NJDEP and EPA site investigations identified approximately 6 to 10 feet of fill throughout the site. Studies by NJDEP have attributed elevated levels of certain groups of contaminants to this sort of "historic fill" and NJDEP has established remedial practices for addressing areas where "historic fill" is encountered. The RI sought to identify contaminants that might be attributable to "historic fill" as distinguished from contamination problems attributable to the site.

Surface Soil

Surface soil samples were collected from 60 locations including locations on the Martin Aaron and SJPC properties, the scrap-yard, Comarco Products, the Ponte Equities property, and on the Everett and Sixth Street rights-of-way. Laboratory results were compared to site-specific screening levels for a wide range of contaminants.

VOC contamination above screening levels was detected in the surface soil within the limits of the Martin Aaron property, but on no other properties investigated (refer to

Figure 2). The most frequently detected VOCs were tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE), though a variety of different solvents were detected. This pattern is consistent with a drum reconditioning facility that would have handled liquids from a variety of unrelated operations.

SVOCs were detected at 58 of 60 surface soil sampling locations, across the entire study area. With few exceptions, the SVOCs identified in surface soils were poly-aromatic hydrocarbons (PAHs), which are frequently detected in urban soils. PAHs were generally higher on the Martin Aaron property than on other properties, with the highest concentrations in the former process and drum storage areas of the Martin Aaron operation. The earlier tannery operations would have used coal for heating and drying hides, and these same areas of the Martin Aaron property also coincide with former coal storage areas from this earlier operation. The presence of PAHs in surface soil outside of operational areas at the site appears to be associated with "historic fill" at these properties.

Metals above screening levels were detected in virtually all of the surface soil samples collected. Arsenic, barium, and lead were detected most frequently. It is likely that metals exist at elevated levels due to the presence of "historic fill" material at the site and surrounding properties. Industrial operations on neighboring properties probably also played a factor: a glass-making company, a possible source of barium, operated on the scrap-yard property; and a lead smelter operated across Sixth Street from the site. Higher concentrations of metals, particularly arsenic, were found in suspected source areas at the Martin Aaron property, which suggests that there may also be a site-related contribution of metals. Arsenic may be attributable to the drum reconditioning operations, but is also typically a remnant of tannery operations.

Pesticides were infrequently detected in the study area. PCBs were detected above screening levels in only four surface soil samples ranging from 2 to 19 parts per million (ppm).

Subsurface Soils

Subsurface soil samples were collected at 72 sampling intervals at depths ranging from greater than two feet below ground surface (bgs) to approximately 21 feet bgs.

For subsurface soil, VOCs were detected almost exclusively on the Martin Aaron property (refer to Figure 2). Similar to the surface soil, 14 different VOCs were detected in subsurface soil, though few with any frequency (PCE was the most frequently detected). For example, PCE (with a screening level of 0.06 ppm) was detected with a hot spot level of 110 ppm near a location where the former Martin Aaron building existed. At a different location near the middle of the Martin Aaron property, TCE (with a screening level of 0.06 ppm) was found at 630 ppm, and PCE was not detected. These hot spots were found at between four and seven feet bgs. The results suggest that drum reconditioning operations contributed to VOC contamination in subsurface soil at different locations on the property.

SVOCs were identified above screening levels at the Martin Aaron property, in the rights-of-way on Everett Street and Sixth Street, and on the SJPC property. As with the surface soils, the SVOCs detected most frequently in subsurface soil were PAHs that have also been associated with "historic fill." There is some correlation between SVOC concentrations and, for instance, the Martin Aaron building hot spot VOC area on the Martin Aaron property. Elevated SVOCs were identified in the northeastern corner of the SJPC property. It is suspected that a former service station north of the SJPC property may have contributed to the SVOC contamination at this location. The results suggest that SVOCs migrated to subsurface soils as a result of operations at the Martin Aaron site and, possibly, from other sources, as well as contributions from the presence of fill material at these properties.

Metals were found on all properties sampled and at most sampling locations. Metals above screening levels include: antimony, arsenic, barium, cadmium, chromium, lead, mercury, selenium and thallium. The metals appear to be attributable to "historic fill" material or from other sources at these sampling locations, with the exception of arsenic, which appears at concentrations as high as 23,300 ppm at the Martin Aaron building hot spot. By contrast, several of the highest concentrations of lead, the most frequently detected metal, were found across Sixth Street in the right-of-way, in front of the former smelting facility.

Pesticides were infrequently detected in subsurface soil and pesticide concentrations were relatively low (i.e dieldrin was detected in the range of 0.006 to 0.69 ppm). PCBs were also infrequently detected above screening levels. PCBs had been detected with more frequency in NJDEP's RI, but it appears that the 1999-2000 removal actions substantially addressed site PCBs.

The Rhodes Drum Building

The one building still standing on the Martin Aaron property, referred to as the Rhodes Drums building, is actually part of a larger one-storey structure that is primarily situated on the neighboring Ponte Equities property. This one-storey building, along with another much taller building on the Ponte Equities property, are currently unoccupied. Rhodes Drums apparently used only the smaller section situated on the Martin Aaron property for its drum recycling operations. The original one-storey building (on both lots) was probably built by the Castle Kid Company as part of is tanning operations in the early 1900s. Since that time, the buildings on the Ponte Equities property are known to have been used as a book bindery and as a warehouse.

A safety inspection determined that it would be unsafe to perform sampling activities inside the Rhodes Drums building. Soil sampling adjacent to the Rhodes Drums building suggest that there is contamination underneath the building, and NJDEP's earlier investigation of the Rhodes Drums building confirms soil contamination in excess of NJDEP soil cleanup criteria. The soil contamination found included VOCs, PAHs, metals, and pesticides/PCBs.

No sampling was performed in the two structures on the Ponte Equities property as part of the RI. Additional investigations will be necessary to determine if tanning operations resulted in contamination of the one-storey Ponte Equities building.

Groundwater

In order to evaluate hydrogeologic conditions and groundwater quality beneath the site, a total of 24 monitoring wells were installed as part of EPA's RI. An additional 10 wells from the NJDEP RI were also sampled. Two rounds of groundwater sampling were conducted in June and September of 2002. In addition, a CCMUA emergency water supply well (City Well #7) was also sampled.

The groundwater table is generally found about four to seven feet bgs. Below the fill at the site, the hydrogeology is made up of several layers of the Potomac-Magothy-Raritan (PRM) aquifer, which is composed of layers of gravel, sand, silt and clay. The Upper and Middle PRM aquifers were investigated as part of this study. A number of the monitoring wells were placed at or near the water table, within the first 20 feet bgs, and are considered "shallow" wells. Site monitoring wells were also placed within the first 100 feet bgs, or within the Upper PRM Aquifer. The Upper PRM Aquifer is a sand and gravel layer that is separated from deeper units by less conductive clay/silt lenses. A few monitoring wells were also installed to approximately 180 feet bgs, in the Middle PRM Aquifer. Groundwater at the site generally moves to the southeast, influenced by municipal pumping wells.

Groundwater samples were analyzed for VOCs, SVOCs, metals, and PCBs (refer to Figure 3). VOC contamination in the "shallow" wells is primarily limited to within the Martin Aaron property boundary. As with VOC-contaminated soils, 12 different VOCs were detected, led by cis-1,2-DCE, benzene, TCE and PCE. Of the highest concentrations detected, cis-1,2-DCE was found as high as 330 parts per billion (330 ppb) and benzene as high as 31 ppb. While many metals were detected above screening levels in the "shallow" wells, only arsenic, detected as high as 3,700 ppb, appears to be site-related.

In the Upper PRM Aquifer wells, which were screened between 30 and 60 feet bgs, VOCs detected above screening levels include cis-1,2-DCE, TCE, vinyl chloride, dichloropropane, and benzene. VOCs were primarily identified in groundwater samples collected from the Martin Aaron property, with a trend of groundwater contamination moving to the southeast, consistent with the direction of groundwater flow. Groundwater in the area of the Martin Aaron building hot spot were elevated but substantially lower (cis-1,2-DCE at 37 ppb) at this depth. Arsenic was also found at this depth, though at substantially lower concentrations than in the shallow wells.

In wells from deeper units (deeper than 100 feet bgs), the VOCs, TCE and vinyl chloride, were detected at 1.1 ppb and 6.1 ppb, respectively, which are considered relatively low concentrations. City Well #7, which is screened at 123 feet bgs, is not affected by site contamination.

Based on groundwater data collected from the RI, a VOC plume, comprised of cis-1,2-DCE, TCE, PCE and several other constituents, has been determined to be over 1,000 feet long and approximately 600 feet wide in the shallow wells (within the first 20 feet bgs). The plume narrows with depth to approximately 400 feet wide in Upper PRM Aquifer wells at depths of 30 to 60 feet bgs. Vertically, the deepest contamination was found within a confining unit at the base of the Upper PRM Aquifer (approx. 110 feet bgs). The confining unit consists of thin sand and clay layers, and wells installed in these sand layers exhibited the deepest, albeit relatively low VOC

WHAT IS A "PRINCIPAL THREAT"?

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in groundwater may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element. In addition, NJDEP has recommended that soils contaminated with VOCs in excess of 1 ppm may also be a source of groundwater contamination, and soils in excess of that criterion are also considered principal threat waste.

concentrations.

A smaller arsenic groundwater plume exists in the shallow aquifer, with arsenic concentrations decreasing with depth.

SCOPE AND ROLE OF THE ACTION

This action, referred to as Operable Unit 1 (OU1), will be the only action for the site, addressing both contaminated soil and groundwater. EPA's findings indicate the presence of "principal threat" wastes at the site, primarily on the Martin Aaron property.

Concurrent with EPA's RI/FS, NJDEP and the SJPC property owner evaluated potential remedies for the SJPC property. After evaluating previous site uses and the EPA/NJDEP sampling results, NJDEP concluded that the contamination at the SJPC property could be attributed to "historic fill" in the area, and not to the Martin Aaron site. For example, Martin Aaron, Inc. only leased part of the SJPC property for drum storage, and sample results in areas used by the Martin Aaron operation had similar results when compared to areas not used by Martin Aaron. NJDEP also concluded that the contamination on the SJPC property, primarily metals and PAHs, did not appear to be a source to the groundwater contamination in the area.

Given these conditions, NJDEP, with EPA's concurrence, plans to proceed with a remedy for the SJPC property, independent of the Martin Aaron site. NJDEP's Technical Regulations require that if "historic fill" material is not treated or removed from a site, engineering and institutional controls shall be implemented. An engineering control (capping) would be required at the SJPC property prior to reuse, along with a deed notice to assure the long-term maintenance of the cap.

This Proposed Plan addresses the contaminated soils and groundwater for the Martin Aaron site and adjacent properties, not including the SJPC property.

EPA's findings indicate the presence of "principal threat" wastes at Martin Aaron, which are also addressed by this Proposed Plan, in the form of VOC and arsenic hot spots at several areas that lie primarily on the Martin Aaron property.

SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants in soils and groundwater on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects caused by hazardous substance release from a site in the absence of any actions or controls to mitigate these under current and future land uses. The Martin Aaron site is bounded by residential and commercial properties. Martin Aaron is currently zoned for commercial/industrial use. According to the City of Camden, it is anticipated that the future land use for the Martin Aaron site will be commercial/industrial.

Human Health Risks

The human health risk assessment evaluated exposure to surface and subsurface soils at the Martin Aaron property, the scrap-yard, and the properties adjacent to the facility under several exposure scenarios, including current trespasser exposure to surface soils, future exposure to surface and subsurface soils by commercial/industrial workers and construction workers, as well as future use of groundwater as a potable water supply. It should also be noted that the human health risk assessment evaluated potential risks under a future residential scenario through exposure to contamination in the soils and groundwater; however, it is currently anticipated that future land use for the site will not include residential development.

At the Martin Aaron property, direct contact exposure to soils is associated with excess lifetime cancer risks levels

of 2.3 x 10^{-4}, 1.6 x 10^{-3}, and 1.9 x 10^{-4} for the trespasser, the commercial/industrial worker, and the construction worker, respectively, with benzo[a]pyrene and arsenic as the primary contributors to the risk. The non-cancer hazard indices exceed EPA's benchmark of 1 for the trespasser (3.9), commercial/industrial worker (11.9), and the construction worker (8.6) with arsenic, mercury and PCBs contributing most significantly.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk). For non-cancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which non-cancer health effects

In the scrap-yard area, an excess lifetime cancer risk of 8.2 x 10^{-4} and a hazard index of 6.3 are estimated for the commercial/industrial worker in direct contact with soils. For both estimates, arsenic is the largest contributor to the risk and hazard. Risks and hazards to other populations evaluated are within acceptable limits.

Exposure to the commercial/industrial worker to the contaminants in soils at the properties adjacent to the site is associated with an excess lifetime cancer risk of 6.8 x 10^{-4} and a non-cancer hazard index of 5.6, with arsenic as the most significant contributor to the risk. Risks and hazards to other populations evaluated are within acceptable limits.

Exposure to groundwater as a drinking water supply in both the Upper PRM and the Middle PRM aquifers was also evaluated in the human health risk assessment. The evaluation of the Upper PRM indicates excess lifetime cancer risks of 1.9 x 10^{-2} for the commercial/industrial worker and a non-cancer hazard index of 130; the most significant contributors to these risks are arsenic and vinyl chloride. The Middle PRM was also evaluated and the non-cancer hazard index was found to be 7, with arsenic as the largest contributor; the excess lifetime cancer risk was within acceptable limits.

These risks and hazard levels indicate that there is significant potential risk to workers and trespassers from direct exposure to contaminated soil and groundwater. The risk estimates are based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure to the soil and groundwater, as well as the toxicity of the chemicals of concern, including arsenic, benzo[a]pyrene, and vinyl chloride.

Ecological Risks

The screening-level ecological risk assessment (SLERA) results indicate potential risks to terrestrial plants, terrestrial wildlife, and soil invertebrates from direct exposure to PAHs, inorganic chemicals, several pesticides, PCBs, SVOCs and VOCs in the site soils. A groundwater evaluation indicated very little potential to adversely affect aquatic life due to the limited possibilities of groundwater reaching the surface. No further consideration of groundwater was warranted in the Ecological Risk Assessment.

Further consideration of the potential ecological risks may be warranted; however, the habitats at the site have been highly disturbed and the area provides only very limited viable habitat for ecological receptors.

It is EPA's current judgment that the Preferred Alternatives identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, are necessary to protect human health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

The following remedial action objectives for contaminated soil and groundwater address the human health risks and environmental concerns at the Martin Aaron site.

Remedial Action Objectives for Soil

The remedial action objectives for soil are to:

- Reduce or eliminate the direct contact threat associated with contaminated soil to levels protective of a commercial or industrial use, and protective of the environment;
- Prevent erosion and off-site transport of contaminated soils; and
- Reduce or eliminate the migration of site contaminants from soil to groundwater.

This proposed action would reduce the direct contact excess cancer risk associated with exposure to contaminated soils to one in one million for commercial/industrial use of the site. This will be achieved by reducing exposure to the concentrations of the soil contaminants to the target levels indicated in Table 1 in surface soil (soil within the first two feet of ground surface). Because there are no promulgated Federal or State cleanup standards for soil contamination, EPA established these targets, or Cleanup Goals, based upon the baseline risk assessment. Targets were selected that would both reduce risk associated with exposure to soil contaminants to an acceptable level and ensure minimal migration of contaminants off the site.

With regard to arsenic, EPA evaluated the level of arsenic contamination that is more likely to be attributable to "historic fill," which was found at a range of less than 20 ppm to 339 ppm on and off the site, and concluded that soils contaminated with arsenic at concentrations greater than 300 ppm are probably associated with both the tannery and the drum reconditioning operations at the Martin Aaron property, and concentrations less than 300 ppm are more typical of "historic fill". An arsenic groundwater plume is also centered on the Martin Aaron property, and the high arsenic contamination levels in soils are probably exacerbating these conditions. Table 1 identifies 20 ppm as a direct-contact Cleanup Goal for arsenic, but this action identifies arsenic hot spots on Martin Aaron at concentrations greater than 300 ppm, and requires more rigorous remedies for arsenic associated with site releases.

Because some deeper soils, down to an estimated 10 feet below ground surface, are contaminated with VOCs at levels that act as continuing sources of groundwater contamination, this proposed action would reduce this threat by remediating contaminated soils in excess of 1 ppm total VOCs. In addition, the presence of VOCs in soil is closely linked to Martin Aaron site activities.

Based upon communications with the City and other interested parties, including supporters of the Waterfront South redevelopment project, reuse expectations for the Martin Aaron property and neighboring properties are for commercial redevelopment. Of the adjacent properties, only Comarco Products is currently in active use.

As with NJDEP's evaluation of the SJPC property, EPA's investigation identified contamination in a number of areas nearby the Martin Aaron property that is consistent with "historic fill" and does not appear to be the result of contaminant releases from the Superfund site. These areas include the rights-of-way on Everett and Sixth Streets, and most of Comarco Products and the Ponte property. Soil contamination on the Martin Aaron property, the scrap-yard, and on portions of Comarco Products and the Ponte property appear to be attributable to the Martin Aaron Superfund site.

EPA has developed direct-contact Cleanup Goals that are appropriate for the Martin Aaron site that would be protective under a future-use commercial redevelopment scenario. The direct-contact Cleanup Goals, identified in Table 1, are similar to with New Jersey Soil Cleanup Criteria for Non-Residential Direct Contact. These direct-contact Cleanup Goals would also be protective for commercial redevelopment of other neighboring properties; however, they would not be appropriate for an unrestricted future residential use of remediated properties.

Remedial Action Objectives for Groundwater

The remedial action objectives for groundwater are to:

- Prevent public exposure to contaminated groundwater that presents a significant risk to public health and the environment;
- Remediate groundwater to the extent practicable and minimize further migration of contaminants in groundwater; and
- Restore the groundwater to drinking water standards within a reasonable time frame.

There are currently no complete exposure pathways to contaminated groundwater beneath the Martin Aaron site because there are no known contaminated wells in use. All residents in the area of the Martin Aaron site are currently on city-supplied water. If contaminated groundwater is used as drinking water in the future, significant health risks would exist. In addition, if the contaminated groundwater were used in industrial processes within the area, significant human health risks may exist. Finally, vapor intrusion into new or existing structures is a potential exposure pathway from VOCs in groundwater. Thus, remedial actions must minimize the potential for human exposure to contaminated groundwater.

Groundwater within the source area must be remediated to the extent practicable. The presence of clay and silt stringers within the uppermost water bearing zone and high contaminant concentrations in groundwater (specifically of arsenic), make it difficult to restore groundwater to the MCLs or the New Jersey groundwater quality concentrations (GWQCs) in the foreseeable future, even with active remediation of groundwater. Further migration of contaminants to groundwater outside the source areas should be minimized to allow remediation of groundwater in a reasonable time frame.

Table 2 lists the contaminants of concern found in groundwater at the site, and their respective Cleanup Goals, in this case the drinking water standards (MCLs) or GWQCs. Cleanup Goals were selected that would both reduce the risk associated with exposure to contaminants to an acceptable level and ensure minimal migration of contaminants off the site.

SUMMARY OF REMEDIAL ALTERNATIVES

Remedial Alternatives for both soils and groundwater are presented below. CERCLA requires that if a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, EPA must review the action no less often than every five years after initiation of the action. In addition, institutional controls in the form of a deed notice to limit the use of portions of the property may be required. The type of restriction and enforceability may need to be determined after completion of the remedial alternative selected in the ROD. Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on institutional controls to achieve protectiveness. The time frames below for construction do not include the time for remedial design or the time to procure contracts.

Common Elements: Soil Alternatives

Several of the soil alternatives include common components. Alternatives S2 through S6 include the demolition of at least the Rhodes Drums building (the section on the Martin Aaron property). Demolition of this building is assumed because it is likely that site contamination is under the building, and because its poor structural condition could limit the ability to safely remediate other areas of the site. Less is known about the adjoining one-storey Ponte Equities building, which may also reside on top of site contamination from its years as part of tannery operations.

The active remedies address surface soil contamination through capping (Alternatives S2 through S5) or excavation and off-site disposal (Alternative S6). Alternatives S3 through S6 address principal threat waste, VOC- and arsenic-contaminated soil that are a source of groundwater contamination, through a combination of different treatment technologies or excavation and off-site disposal. Alternative S2 only passively addresses principal threats through capping, and would need to be coupled with an active groundwater remedy to satisfy the remedial action objectives.

Since each alternative would result in soil contamination remaining on-site at levels that would not allow for unrestricted use, institutional controls would be employed to ensure that future site activities be performed with knowledge of the site conditions, that appropriate health and safety controls would be in place, and, that unrestricted use of the property would not be allowed.

SOIL ALTERNATIVES

Alternative S1: No Action

Estimated Capital Cost: *$0*
Estimated Annual O&M Cost: *$0*
Estimated Present Worth Cost: *$0*
Estimated Construction Time frame: None

Regulations governing the Superfund program generally require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at Martin Aaron or the surrounding properties to prevent exposure to the soil contamination and the contaminated soil would be left in place. Existing temporary measures (i.e., limited access through fencing) would provide limited protectiveness, but they would not be monitored or maintained.

Redevelopment of Martin Aaron would pose a high risk of direct contact exposure to construction workers and future users, and may exacerbate off-site contaminant migration.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative S2: Capping and Institutional Controls

Estimated Capital Cost: *$2,970,000*
Estimated Annual O&M Cost: *$18,500*
Estimated Present Worth Cost: *$3,310,000*
Estimated Construction Time frame: 2 months

Under this alternative, the areas of contaminated soil exceeding the direct-contact Cleanup Goals would be capped to prevent direct contact with the soil contamination. Capping would limit groundwater infiltration through the source areas, reducing the rate of contaminant migration out of the VOC and arsenic hot spots. Asphalt capping has been specified, for cost-estimation purposes, though a redevelopment plan including a combination of building foundations and other ground covers could be designed that would be protective.

Demolition of the existing Rhodes Drums building at the site would be conducted since soil contamination extends up to the building walls and may extend beneath the building.

Institutional controls would consist of land use restrictions that would prevent disturbance of and assure the maintenance of the cap. A deed notice prepared in accordance with the NJDEP Technical Requirements for Site Remediation would need to be placed on the affected properties identifying the areas of soil with contamination, and the areas with site-specific engineering controls. As part of redevelopment plans, properties would also have a requirement for VOC vapor controls for newly constructed buildings.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative S3: Solidification of Arsenic Source Areas, Soil Vapor Extraction of VOC Source Areas, and Capping

Estimated Capital Cost: *$3,240,000*
Estimated Annual O & M Cost (0-2 yrs): $125,900
Estimated Annual O & M Cost (3-50 yrs): $8,800
Estimated Present Worth Cost: *$3,630,000*
Estimated Construction Time frame: *2.5 years*
Estimated O & M Time frame for SVE: *2 years*

This alternative consists of a combination of treatment technologies to address the Source Areas, coupled with capping. To address the VOC-contaminated soil, this alternative includes installation of a soil vapor extraction (SVE) system. In addition, this alternative calls for the stabilization of soil with concentrations of arsenic over 300 ppm, through the addition of a concrete mixture into the soil.

The volume of soil containing VOCs to be treated with SVE is estimated at 12,150 cubic yards and the volume of soil containing arsenic to be stabilized is approximately 16,000 cubic yards; however, in some cases, the VOC Source Areas and the Arsenic Source Areas overlap on the site. While stabilization has been marginally successful in treating VOC-contaminated soil at some sites, SVE cannot be used to treat arsenic contamination. In addition, stabilization can be performed in one construction step, whereas SVE involves the installation and operation of an in-ground system over a number of months or years. Under this alternative, stabilization would be performed first, including in areas where arsenic and VOCs are co-located, followed by SVE in remaining areas with only VOC contamination. The O&M time frame estimated (above) is for the expected operation period of the SVE system.

This alternative also includes the demolition of the Rhodes Drums building and capping of residual soils, including the treated soils, similar to Alternative S2. Institutional controls, similar to those described in Alternative S2, would be required to assure the protectiveness of the cap and to prevent disturbance of the stabilized soil.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative S4: Excavation and Off-site Transportation of Source Areas with Treatment as necessary prior to Land Disposal, Capping Residual Soils

Estimated Capital Cost: *$6,400,000*
Estimated Annual O & M Cost (30 years): *$8,800*
Estimated Present Worth Cost: *$6,580,000*
Estimated Construction Time frame: *5 months*

This alternative includes excavation of approximately 28,000 cubic yards of both the VOC and arsenic Source Areas, transportation, and off-site disposal, with treatment as necessary to allow for land disposal. The unexcavated portions of the Martin Aaron site, an area of approximately 2.0 acres where soils exceed the direct-contact Cleanup Goals, would be capped as presented in Alternatives S2 and S3. This alternative meets the remedial objectives by removing highly contaminated soils that are continuing to leach VOCs and arsenic to groundwater and eliminates contact with the remaining soil contamination by capping. Off-site treatment of the excavated soil may be needed prior to disposal if the soil exhibits hazardous characteristics as defined by the Resource, Conservation and Recovery Act (RCRA) and, therefore, treatment would be required to meet the RCRA Land Disposal Requirements (LDRs). For cost estimating purposes, the FS assumed 30 percent of the excavated soil would undergo treatment prior to disposal.

This alternative also includes the demolition of the Rhodes Drums building and capping of residual soils, including the treated soils, similar to Alternative S2. Excavated areas would be backfilled with clean fill. Institutional controls, similar to those described in Alternative S2, would be required to assure the protectiveness of the cap.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative S5: Excavation and Off-site Transportation of Arsenic Source Areas with Treatment as necessary prior to Land Disposal, Treatment of VOC Source Areas via Soil Vapor Extraction, Capping Residual Soils

Estimated Capital Cost: *$5,800,000*
Estimated Annual O & M Cost (0-2 yrs): *$125,900*
Estimated Annual O & M Cost (3-50 yrs): *$8,800*
Estimated Present Worth Cost: *$6,190,000*
Estimated Construction Time frame: *2.5 years*
Estimated O & M Time frame for SVE: *2 years*

This alternative includes excavation of the arsenic Source Areas, transportation, and off-site disposal, with treatment as necessary to allow for land disposal. Treatment of the soil prior to disposal may be needed if required by the RCRA LDRs. In addition, the VOC Source Areas would be addressed through the installation of an SVE system, as described in Alternative S3. The O&M time frame estimated (above) is for the expected operation period of the SVE system.

This alternative also includes the demolition of the Rhodes Drums building and capping of residual soils that exceed the direct-contact Cleanup Goals, similar to Alternative S2. Excavated areas would be backfilled with clean fill. Institutional controls, similar to those described in Alternative S2, would be required to assure the protectiveness of the cap.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative S6: Excavation and Off-site Transportation of Residual Soils and Source Areas with Treatment as necessary prior to Land Disposal, Engineering Controls

Estimated Capital Cost: *$ 8,300,000*
Estimated Annual O & M Cost: *$0*
Estimated Present Worth Cost: *$8,300,000*
Estimated Construction Time frame: *4 years*

Alternative S6 would result in the excavation of all soils within the Source Areas and all soils exceeding the direct-contact Cleanup Goals. The depth of excavation varies from two feet to a maximum depth of about 10 feet. The

SUMMARY OF REMEDIAL ALTERNATIVES MARTIN AARON SITE		
Medium	FS Designation	Description
SOIL	Alternative 1 (S1)	No action
	Alternative 2 (S2)	Capping and Institutional Controls
	Alternative 3 (S3)	Solidification of Arsenic Source Areas, Soil Vapor Extraction (SVE) of VOC Source Areas, and Capping
	Alternative 4 (S4)	Excavation and Off-site Transportation of Source Areas with Treatment as necessary prior to Land Disposal, Capping Residual Soils
	Alternative 5 (S5)	Excavation and Off-site Transportation of Arsenic Source Areas with Treatment as necessary prior to Land Disposal, Treatment of VOC Source Areas via Soil Vapor Extraction, Capping Residual Soils
	Alternative 6 (S6)	Excavation and Off-site Transportation of Residual Soils and Source Areas with Treatment as necessary prior to Land Disposal, Engineering Controls
GROUNDWATER	Alternative 1 (G1)	No action
	Alternative 2 (G2)	Monitored Natural Attenuation (MNA) and Institutional Controls
	Alternative 3 (G3)	Containment with Hydraulic Controls
	Alternative 4 (G4)	Geochemical Fixation and MNA
	Alternative 5 (G5)	Groundwater Collection and Treatment

area of excavation would encompass a majority of the Martin Aaron property and on surrounding properties, resulting in excavation of approximately 64,500 cubic yards. Similar to Alternative S4, Source Area soils would be treated, as necessary, prior to land disposal to satisfy the RCRA LDRs.

This alternative also includes the demolition of the Rhodes Drums building. Because the site Cleanup Goals are protective for a commercial end-use, but not for unrestricted use, this alternative would not allow for unrestricted future use in some portions of the site. In that case, institutional controls similar to those described in Alternative S2 would be needed to assure the protectiveness of the remedy.

Similar to Alternatives S2 and S3, this alternative may result in soil contamination remaining on site at levels that would not allow for unrestricted use. Therefore, a review of the site at least every 5 years would be required, unless determined otherwise.

Common Elements: Groundwater Alternatives

Performance of the four active groundwater remedial alternatives would be greatly enhanced by an active soil remedy to address the soil Source Areas, which would substantially reduce both the volume of principal threat wastes at the site and groundwater contaminant contribution. None of the groundwater alternatives would fully remediate the groundwater without an active soil remedy.

All active groundwater alternatives require a long-term monitoring program to assess effectiveness and to monitor the migration of contamination over time. While the zone of contaminated groundwater is not currently in use, and no water supplies are threatened, the active remedies (Alternatives GW2 through GW5) would require institutional controls such as a Classification Exception Area (CEA) to restrict use of the groundwater until remediation goals are achieved.

GROUNDWATER ALTERNATIVES

Alternative G1: No Action

Estimated Capital Cost: *$0*
Estimated Annual O&M Cost: *$0*
Estimated Present Worth Cost: *$0*
Estimated Construction Time frame: None

Regulations governing the Superfund program generally require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action to prevent exposure to the groundwater contamination. Institutional controls would not be implemented to restrict future groundwater use.

If no soil or groundwater action is taken, groundwater contamination will persist above the remediation goals, and the plume may expand over time. If an active soil remedy addresses the source areas, but no groundwater action is taken, VOC and arsenic plumes would still persist for a number of years (roughly estimated over 50 years).

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative G2: Monitored Natural Attenuation (MNA) and Institutional Controls

Estimated Capital Cost: *$23,925*
Estimated Annual O & M Cost (0-2 yrs): *$207,418*
Estimated Annual O & M Cost (3-50 yrs): *$25,927*
Estimated Present Worth Cost: *$550,000*
Estimated Construction Time frame: *0 years*

Alternative G2 relies on natural attenuation to address the groundwater plume while placing use restrictions on the area of groundwater exceeding the Cleanup Goals until groundwater returns naturally to acceptable levels. Alternative G2 relies on remediation of the soil Source Areas (through the selection of an active soil remedy) and cannot satisfy the remedial action objectives alone.

Studies performed during the RI indicate that natural attenuation of VOCs is probably underway. Natural attenuation is the process by which contaminant concentrations are reduced by conditions already present in the groundwater, such as volatilization, dispersion, adsorption, and biodegradation. VOC contamination is amenable to natural attenuation under certain conditions, some of which appear to exist at the site. These natural degradation processes may decrease VOC contaminant concentrations over time, especially if an active soil remedy is undertaken to address VOC source areas. The prospects for natural mechanisms to decrease the concentration or mobility of arsenic in groundwater are very limited, though a soil remedy addressing arsenic source areas would improve groundwater conditions.

Under this alternative, a soil remedial alternative that either treats or removes the soil Source Areas would minimize further contaminant contribution to the plume, thus substantially decreasing the time until natural attenuation achieves the remedial goals. The main remedial components of this alternative include groundwater use restrictions and monitoring.

Institutional controls, such as a CEA, would be implemented. The components of the CEA include the location of the restriction (including areas of potential migration before degradation reduces contaminant concentrations to below applicable cleanup criteria), the compounds detected over the applicable cleanup criteria, and the proposed duration of the restriction. This control would restrict future use of the groundwater within the area over the duration of the CEA.

Alternative G2 would require a monitoring program, which would establish a set of groundwater conditions that would be expected to be met over time, if natural attenuation is succeeding. If monitoring of the groundwater contamination indicates that natural attenuation would not achieve the remediation goals, active restoration with one of the other alternatives G3, G4, or G5 presented later, would be implemented.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative G3: Containment with Hydraulic Controls

Estimated Capital Cost: *$1,600,000*
Estimated Annual O&M Cost: *$580,000*
Estimated Present Worth Cost: *$7,800,000*
Estimated Construction Time frame: *3 months*

The objective of Alternative G3 is to intercept the contaminated groundwater using a series of extraction wells along the downgrading edge of the contamination to control the off-site migration of the plumes. This alternative would meet the remedial objectives by preventing downgradient migration of the plume and protection of any receptors, and eventual capture of the plume.

The alternative would consist of extraction wells, pretreatment of arsenic and VOC contamination, and discharge to the POTW (i.e., the Camden County Municipal Utilities Authority (CCMUA)). The groundwater use restrictions are the same as described for Alternative G2, and a monitoring program would also be required.

While the lateral extent of the contamination extends to approximately 125 feet bgs, the bulk of the contamination is within 50 feet of the ground surface. Active pumping to a depth of approximately 50 feet is expected to contain the portion of the plume that has the highest potential to migrate. For cost estimation purposes, the FS assumed

that three extraction wells along the downgrading edge of the plume, pumping at a combined 20 gallons per minute (20 gpm), would contain the plume. Because the arsenic and VOC plumes migrate at different rates, additional extraction wells could be installed within the arsenic plume to also control the migration of the arsenic plume.

If coupled with an active source control remedy for the soils, preliminary calculations estimate a time frame of 20 years to completely remediate the aquifer.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative G4: Geochemical Fixation and MNA

Estimated Capital Cost: *$1,200,000*
Estimated Annual O&M Cost: *$26,000*
Estimated Present Worth Cost: *$1,700,000*
Estimated Construction Time frame: *6 months*

Alternative G4 includes geochemical fixation to address the arsenic-contaminated groundwater, along with MNA (similar to Alternative G2) to address the VOCs. Geochemical fixation involves introducing a polymer into an area with high arsenic concentrations. This particular process entails the mechanical mixing of an estimated 64,000 cubic yards of soil over the course of a number of months. The chemical process transforms metal contaminants to low-solubility precipitates. The conversion of contaminants to low-solubility precipitates eliminates their mobility and prevents them from being drawn into water wells if any wells were installed at the site in the future. At Martin Aaron, polymers would be introduced to a depth of approximately 15 to 20 feet. This depth includes the shallow aquifer and an underlying clay layer where the arsenic concentrations appear to be highest. A pilot study to evaluate methods of distributing chemicals and the resulting effectiveness would be required prior to full scale injection.

The groundwater use restrictions and MNA are as described for Alternatives G2 and G3. This alternative would also include long-term monitoring to assess the effectiveness of the remedy. If coupled with an active source control remedy for the arsenic-contaminated soils, preliminary calculations estimate a time frame of 40 years to completely remediate the aquifer.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

Alternative G5: Groundwater Collection and Treatment

Estimated Capital Cost: *$1,700,000*
Estimated Annual O&M Cost: *$700,000*
Estimated Present Worth Cost: *$6,600,000*
Estimated Construction Time frame: *3 months*

The objective of Alternative G5 is to aggressively remediate the contaminated groundwater plume by extraction and treatment of all of the contaminated groundwater, with discharge of the treated water to the CCMUA. The groundwater extraction and treatment system would consist of extraction wells, on-site pretreatment (assumed, for cost-estimating purposes, to be a combination of air-stripping and vapor-phase carbon to address the VOCs and chemical precipitation to address metals), and discharge to the POTW. The extraction wells would be placed in the contaminated portions of the plume to depths of approximately 50 feet, pumping at a rate of 85 gpm. In order to determine if chemical precipitation would be necessary, contaminant concentrations were estimated for the collection system discharge and compared against the CCMUA pretreatment limits. Arsenic was the only groundwater contaminant that may exceed the limits. Based on this evaluation, arsenic removal with chemical pretreatment would be needed prior to discharge to CCMUA. The groundwater use restrictions and monitoring of groundwater are as previously described in Alternative G2.

If combined with an active soil remedy to address the Source Areas, it has been estimated that this system would be operated for 10 years to restore the aquifer.

Since this alternative results in contaminants remaining on site above levels that would not allow for unlimited use, a review of the site at least every 5 years would be required.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select an alternative. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. The "Detailed Analysis of Alternatives" can be found in the FS.

1. **Overall Protection of Human Health and the Environment**

Soils

The no further action alternative is not protective because it does not prevent direct contact with site soils and allows continued leaching of VOCs and metals to groundwater.

Alternatives S2 through S6 are all considered protective of human health because they all prevent direct contact with contaminated soils in excess of the direct contact Cleanup Goals. Because the direct-contact Cleanup Goals are appropriate for commercial or industrial uses, but not for unrestricted use, the implementation of institutional controls such as a deed notice would be required for any of the active remedies to assure protectiveness over the long term. Alternative S2 relies primarily on capping and institutional controls to meet the remedial action objectives, and does little on its own to address the arsenic and VOC hot spots.

Groundwater

The no further action alternative is not considered protective because it does nothing to prevent exposure to contaminated groundwater in the future, which would result in unacceptable future risks.

The remaining alternatives are considered protective. Alternative G2 (MNA and Institutional Controls) is considered protective because it includes restrictions on the use of groundwater and includes groundwater monitoring to evaluate natural attenuation and ensure that the plume does not migrate to areas that would result in human exposure. Alternative G2 eliminates human contact. Alternatives G3 through G5 also meet the threshold of preventing human exposure. Alternatives G3, G4, and G5 take differing approaches to controlling or remediating the groundwater contamination; however, none of these alternatives are expected to remediate the groundwater without the aid of a complimentary soil remedy that addresses the soil Source Areas.

2. **Compliance with ARARs**

Soils

Actions taken at any Superfund site must meet all applicable or relevant and appropriate requirements (ARARs) of federal and state law or provide grounds for invoking a waiver of those requirements. There are no chemical-specific ARARs for the contaminated soil. The Cleanup Goals are risk-based for the surface soils, and are similar to NJDEP's non-residential direct contact soil criteria. In addition, NJDEP has developed Impact to Groundwater Soil Cleanup Criteria to address sources of groundwater contamination in deeper soils, and EPA considered these criteria in developing the Source Area Cleanup Goals for this site. Alternative S2 relies on capping to address the direct contact Cleanup Goals, and Alternative S6 relies on excavation. Alternatives S3, S4, and S5 rely primarily on capping to achieve the direct contact Cleanup Goals.

Alternative S2 does little to meet the source control Cleanup Goals, besides some reduction in surface water infiltration that would reduce contaminant mobilization. Alternative S2 paired with groundwater Alternative G3 (Containment and Hydraulic Controls) could achieve the source control Cleanup Goals in soils through a containment strategy. Alternatives S3 through S4 would satisfy the source control Cleanup Goals through various combinations of excavation and treatment.

Based upon the available documentation regarding the site, EPA has concluded that the soil contaminants are not listed hazardous waste. Some soil testing has identified soils that exhibit hazardous characteristics, and if excavated, these soils would need to be treated to meet RCRA Land Disposal Restrictions prior to disposal in a RCRA compliant unit.

Location- and Action-specific ARARs would be met under all the active alternatives.

The site does not contain any wetlands nor is it considered located in a flood plain or coastal zone.

Groundwater

The groundwater Cleanup Goals (see Table 2) are MCLs or groundwater quality standards and, therefore, ARARs. Alternative G1 (No Action) would not meet ARARs. Alternative G2 (MNA and Institutional Controls) relies on the effectiveness of a complimentary soil remedy to remediate source areas, after which natural attenuation would eventually allow the aquifer to recover. Depending upon the selected soil remedy, the most highly contaminated arsenic in groundwater would not recover in a reasonable time frame under Alternative G2. None of the active groundwater treatment Alternatives (G3, G4 and G5) are expected to restore the aquifer without implementation of a soil source control remedy.

Alternatives G2 through G5 would require institutional controls, such as a CEA, to control use of the groundwater until groundwater Cleanup Goals can be met.

Because the No Action alternatives (S1 and G1) do not meet the threshold criteria (Protection of Human Health and the Environment and Compliance with ARARs), they were eliminated from consideration under the remaining seven criteria.

3. **Long-term Effectiveness and Permanence**

Soils

Alternative S6 offers the highest degree of permanence because it is expected to achieve the greatest removal of arsenic and VOCs from the soils through excavation and off-site treatment and disposal. Alternative S4 is the next best alternative relative to long-term effectiveness since the largest mass is removed from the site. Alternatives S3 and S5 are ranked lower than S4 and S6, since they involve in-situ treatment of the soil sources areas, but are still effective and permanent in the long-term. Alternative S2 is considered the least effective alternative in the long-term because it does not remove VOCs or arsenic or limit leaching to groundwater.

Groundwater

While several of the groundwater alternatives can adequately control the groundwater contamination and even reduce contaminant mass, none of the groundwater alternatives are effective in the long term without the implementation of a source control remedy for soils. In addition, the presence of clay and silt lenses within the shallow aquifer will make groundwater restoration difficult, especially for arsenic, since metals tend to sorb onto clay particles making them difficult to remediate.

Alternative G5 ranks higher than Alternative G3 (the two pumping alternatives) in long-term effectiveness and permanence since its goal is to restore aquifer conditions in a reasonable period of time, whereas Alternative G3 is only meant to control migration. Alternative G4 ranks higher than Alternatives G3 and G5 for the arsenic plume because the arsenic is quickly treated after injection, curtailing or eliminating mobility. Alternative G4 ranks lower than the pumping alternatives (G3 and G5) for the VOC portion of the plume.

Alternative G2, Natural Attenuation and Institutional Controls, may not attain the goal of aquifer restoration in a reasonable time frame, because the highest concentrations of arsenic in the groundwater may take 50 or more years to reach acceptable levels.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are legally applicable, or relevant and appropriate to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment**

Soils

Alternative S2 does not reduce the mobility, toxicity or volume of contaminants through treatment.

SVE is the only technology considered that would destroy contamination from the Source Areas, reducing the toxicity, mobility and volume of the VOC contamination. Solidification also would reduce the toxicity and mobility, but not the volume, of the arsenic Source Areas because the metal contamination would remain on site. Solidification can result in an increase in contaminant volume, through the addition of concrete mixtures to the soil.

Regarding off-site disposal remedies, only Source Area soils that would be considered RCRA characteristic waste would be treated prior to disposal. Therefore, Alternatives S6, S5 and S4, which address the Source Areas through removal, are comparable.

Alternatives S3 and S5 would be rated highest in this criterion by addressing the VOC Source Area soils through treatment. Alternatives S3 through S6 are comparable with regard to addressing the arsenic Source Area soils.

Groundwater

Alternative G4 employs a treatment technology, geochemical fixation, that reduces the toxicity and mobility of arsenic, though it does not address the VOC contamination. Pumping and treatment alternatives (G3 and G5) physically remove the arsenic (and VOCs) from the aquifer. Alternatives G4 and G5 offer a comparable level of improvement in mobility and toxicity reduction, and would be rated higher than the hydraulic containment Alternative G3.

5. **Short-term Effectiveness**

Soils

Alternative S2 has the least potential for construction-related impacts on workers, the community or the environment because it involves minimal construction.

Air monitoring would be an important component for all of the excavation alternatives (S4, S5, and S6) and for any on-site treatment technologies (S3 and S5) so that workers would wear the appropriate health and safety protection equipment during intrusive construction activities. Perimeter air monitoring would be required to assure that no vapor or dust releases occur during construction or O&M phases. Emission control techniques, such as the use of dust suppressants and minimizing the open working area of the excavation, would be employed as needed to minimize adverse affects on workers and the community from the site. Trucking routes with the least disruption to the surrounding community would be utilized.

Appropriate transportation safety measures would be required during the shipping of the contaminated soil for off-site disposal.

Alternative S6 is the most disruptive alternative to local properties because it would involve the largest soil excavation and could temporarily disrupt activities at, for example, Comarco Products.

Alternatives S4, S5, and S6 achieve remedial action objectives more quickly than Alternatives S2 and S3 since they each involve some type of excavation, which takes less time to implement. Of S4, S5 and S6, Alternatives S4 and S6 achieve remedial action objectives most quickly.

The time required for implementation of Alternative S2 is estimated at 2 months. Alternative S3 is estimated to take 2.5 years. SVE is expected to take as long as 2 years to remediate the VOC Source Areas. Alternative S4 is estimated to take 5 months, and Alternative S5 is estimated to take about 2.5 years to implement. The time frame for Alternative S3 assumes concurrent implementation of the SVE and solidification treatment technologies; however, the SVE treatment may need to be completed before solidification can be undertaken on portions of the site, extending the time frame for this alternative to as much as 4 or more years.

Groundwater

Alternative G2 has no community impacts because it involves no construction. Alternatives G3 and G5 have minimal impacts with respect to the protection of workers, the community, and the environment during remedial construction. Alternative G4 has potential worker, community and environmental impacts due to the injection of a high pH material into the aquifer and the substantial soil mixing. Some emissions of VOCs and dust would be unavoidable, though risks to public health would be minimized through air monitoring and emission control measures.

The short-term effectiveness with respect to the time until the remedial action objectives are achieved is quickest for the groundwater collection and treatment Alternatives (G3 and G5). The time frames discussed below assume a source control remedy in soils is implemented. For Alternative G5, it is expected that MCLs in groundwater (with the possible exception of the shallow groundwater closest to the arsenic Source Areas) will be achieved in as little as 10 years. Alternative G3, which is a containment remedy, has a remediation time frame for the VOCs (20 years) but does less to actively address the highest arsenic contamination. Alternative G4 will achieve the remedial action objectives faster than Alternative G3 for arsenic, but will rely on natural attenuation of the VOC plume, which will take longer. Alternative G2 would reach the Cleanup Goals in 45 years, through natural attenuation, after the source is removed.

6. **Implementability**

Soils

No technical implementability concerns exist for Alternatives S2, S4 and S6. All technical components of these Alternatives would be easily implemented using conventional construction equipment and materials. Alternatives S3 and S5 would require treatability studies during remedial design, evaluating how best to implement the SVE system to remove the VOCs, and the solidification of the arsenic. Even after treatability studies to determine the appropriate injection points, solidification agents, dosage rates, and other performance parameters, the uncertainties regarding the implementability would still be high, especially given the heterogeneous nature of the fill material at the site.

Groundwater

Alternatives G2, G3 and G5 can be constructed at the site, and no technical or administrative implementability problems are expected for these alternatives. There is some uncertainty as to the effectiveness of the two pumping remedies, Alternatives G3 and G5, in removing arsenic in the shallowest zones where arsenic concentrations are highest. Neither Alternative G3 or G5 may be able to meet the arsenic MCL in the shallow groundwater because of the relatively thin saturated thickness and low permeability of the soil. These conditions could lead to dewatering of the shallow groundwater above the clay and limit the ability to flush dissolved arsenic to the collection wells.

Alternative G4 will require studies to determine a proper chemical dose and mixing needs for precipitation of arsenic. The uncertainties regarding implementability are considered high for Alternative G4, relative to all other groundwater alternatives.

7. **Cost**

Soils

Alternative	Cost
S1	$0
S2	$3,310,000
S3	$3,630,000
S4	$6,580,000
S5	$6,190,000
S6	$8,300,000

Groundwater

Alternative	Cost
G1	$0
G2	$550,000
G3	$7,800,000
G4	$1,700,000
G5	$6,600,000

8. **State/Support Agency Acceptance**

The State of New Jersey is still evaluating EPA's preferred alternatives in this Proposed Plan.

9. **Community Acceptance**

Community acceptance of the preferred alternatives will be evaluated after the public comment period ends and will be described in the Record of Decision, the document that formalizes the selection of the remedy for the site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred alternatives for cleanup of the Martin Aaron site are Alternative S4, excavation and off-site transportation of source areas, and Alternative G5, groundwater collection and treatment, hereafter referred to as the Preferred Alternatives.

Alternative S4 includes excavation, transportation and disposal of approximately 28,000 cubic yards of contaminated soil from the Arsenic and VOC Source Areas, coupled with capping of the residual soil contamination that still poses a direct contact threat, and institutional controls on future land use.

All RCRA characteristic hazardous wastes would be sent for off-site treatment prior to land disposal. The excavations would be backfilled with clean fill. The Preferred Soil Alternative was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through off-site disposal, and is expected to allow the site to be used for its reasonably anticipated future land use, which is commercial/industrial. The Preferred Soil Alternative reduces the risk within a reasonable time frame, and at a cost comparable to other alternatives that use on-site treatment, and provides for long-term reliability of the remedy. Although S3 and S5 were similar in some respects, Alternative S4 was chosen because it has fewer uncertainties in addressing the Source Areas, at a cost comparable to S3 and S5. Since the preferred alternative would achieve the direct contact Cleanup Goals that are protective for commercial/industrial land use, but would not achieve levels that would allow for unrestricted use, institutional controls, such as a deed notice, would be needed.

Alternative G5 includes the installation of groundwater extraction wells to extract and treat the contaminated groundwater, with the goal of restoring the aquifer to the groundwater Cleanup Goals. The extracted groundwater would be pretreated on site using a combination of technologies, such as air-stripping and vapor-phase carbon to address the VOCs and chemical precipitation to address metals, prior to discharge to CCMUA. The actual pretreatment requirements would be determined during remedial design in consultation with CCMUA. Institutional controls such as a CEA would be put in place until the Cleanup Goals are achieved.

The preference for Alternative G5 over other groundwater alternatives is based on a number of factors. With the removal of the VOC Source Areas, natural attenuation may address the remaining VOCs in groundwater in a reasonable time frame; however, the same cannot be said for the arsenic contamination. The removal of the arsenic soil Source Area, as recommended by EPA in this Proposed Plan, is expected to result in some reductions in groundwater arsenic levels, but residual arsenic contamination levels are expected to persist in groundwater. While the VOC plume may attenuate without groundwater remediation, Alternative G5 would speed that process and aggressively reduce the arsenic contaminant concentrations in a relatively short time frame (estimated at 10 years).

The goal of Alternative G5 would be to restore the groundwater to the Cleanup Goals, which are MCLs and groundwater quality standards. With the removal of the soil Source Areas, this goal appears achievable; however, certain site factors, such as the presence of silt and clay layers in the aquifer and the potential for dewatering of the zone of contamination, may limit the effectiveness of the Preferred Alternative in reaching the groundwater Cleanup Goals in a reasonable time frame. Alternative G5 would include a groundwater monitoring program that would evaluate the performance of the remedy over time. Groundwater monitoring would be used to optimize pumping operations and evaluate the likelihood that remedial goals can be achieved through continued or modified pumping.

Institutional controls, such as a Classification Exception Area, would be used to protect public health until the groundwater cleanup goals can be achieved.

The Preferred Alternatives are believed to provide the best balance of tradeoffs among the alternatives based on the information available to EPA at this time. EPA believes the Preferred Alternatives would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Because the Preferred Soil Alternative would treat the RCRA hazardous materials constituting principal threats, the remedy also would meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The selected alternative can change in response to public comment or new information.

Since the Preferred Alternatives would result in contaminated soil remaining on site, institutional controls would be employed to ensure that any future site activities are performed with knowledge of the site conditions including the implementation of appropriate health and safety controls, and to prohibit future unrestricted use of the property.

COMMUNITY PARTICIPATION

EPA and the State of New Jersey provide information regarding the cleanup of the Martin Aaron site to the public through public meetings, the Administrative Record file for the site, and announcements published in the newspaper. EPA and the State encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there. The dates for the public comment period, the date, location and time of the public meeting, and the locations

of the Administrative Record files, are provided on the front page of this Proposed Plan. EPA Region 2 has designated a point-of-contact for community concerns and questions about the Superfund program. To support this effort, the Agency has established a 24-hour, toll-free number the public can call to request information, express concerns or register complaints about Superfund. The Public Liaison Manager for EPA's Region 2 office is:

George H. Zachos
Toll-free (888) 283-7626
(732) 321-6621
U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837

For further information on the Martin Aaron site, please contact:

Mark Austin
Remedial Project Manager
(212) 637-3954

Natalie Loney
Community Relations
Coordinator (212) 637-3639

U.S. EPA
290 Broadway 19th Floor
New York, New York 10007-1866

Table 1
Cleanup Goals for Soil
Martin Aaron Site

Chemical	EPA Direct-Contact Cleanup Goals (Commercial/Industrial)	New Jersey Non-Residential Soil Cleanup Criteria	Source Area Cleanup goals
Metals			
Arsenic	1.6[2]	20	300
VOCs			
Benzene	1.4	13	1
Bis(2-chloroethyl)ether	0.58		
Chloroform	0.47	28	1
Tetrachloroethylene	1.3	6	1
Trichloroethylene	0.11	54	1
Vinyl Chloride	0.75	7	10
SVOCs			
Benzo[a]anthracene	2.1	4	
Benzo[a]pyrene	0.21	0.66	
Benzo[b]fluoranthene	2.1	4	
Benzo[k]fluoranthene	21	4	
Dibenzo[ah]anthracene	0.21	0.66	
Indeno[123-cd]pyrene	2.1	4	
Pesticides			
Aldrin	0.10	0.17	
Dieldrin	0.11	0.18	
PCB - Aroclor 1254	10	2	
PCB - Aroclor 1260	10	2	

Notes:
1. All criteria expressed as parts per million (ppm).
2. NJDEP's arsenic citerion of 20 ppm is derived from background arsenic concentrations found throughout the State of New Jersey. EPA used 20 ppm as its direct contact Cleanup Goal for arsenic in developing this Proposed Plan.
3. Other contaminants found at the site, primarily metals, may not be attributable to site releases. NJDEP would require engineering controls (capping) to prevent direct contact, along with land use restrictions, for soils in excess of New Jersey non-residential cleanup criteria.

Table 2
Cleanup Goals for Groundwater
Martin Aaron Site

Chemical	EPA MCL	NJ MCL	NJ GWQS
Metals			
Arsenic	10	50	8
VOCs			
Benzene	5	1	1
Bis(2-chloroethyl)ether	NA	NA	10
Tetrachloroethylene	5	1	1
Trichloroethylene	5	1	1
Vinyl Chloride	2	2	5
Pesticides			
Dieldrin	NA	NA	0.03

All criteria expressed as parts per billion (ppb).

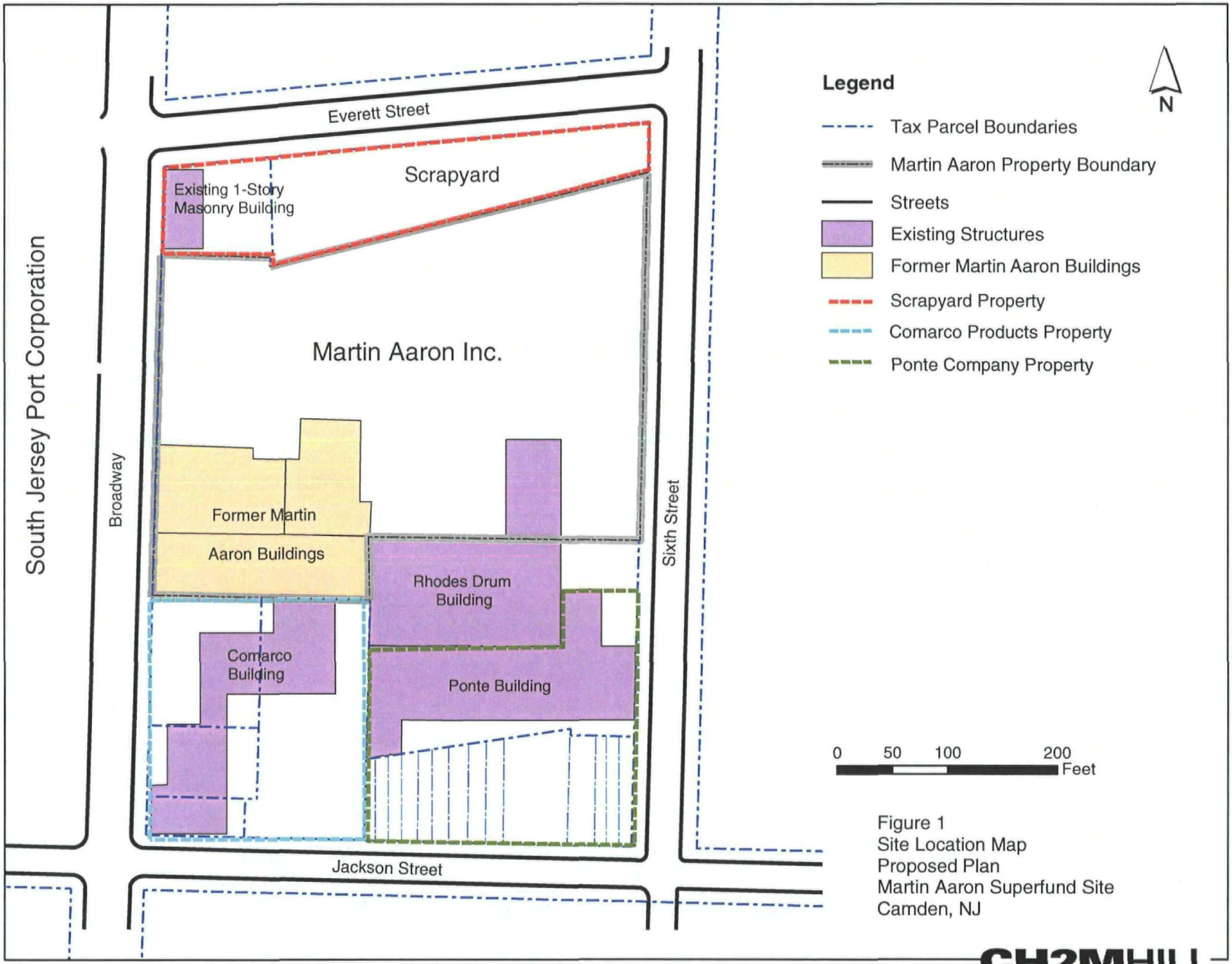

Figure 1
Site Location Map
Proposed Plan
Martin Aaron Superfund Site
Camden, NJ

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10.00024

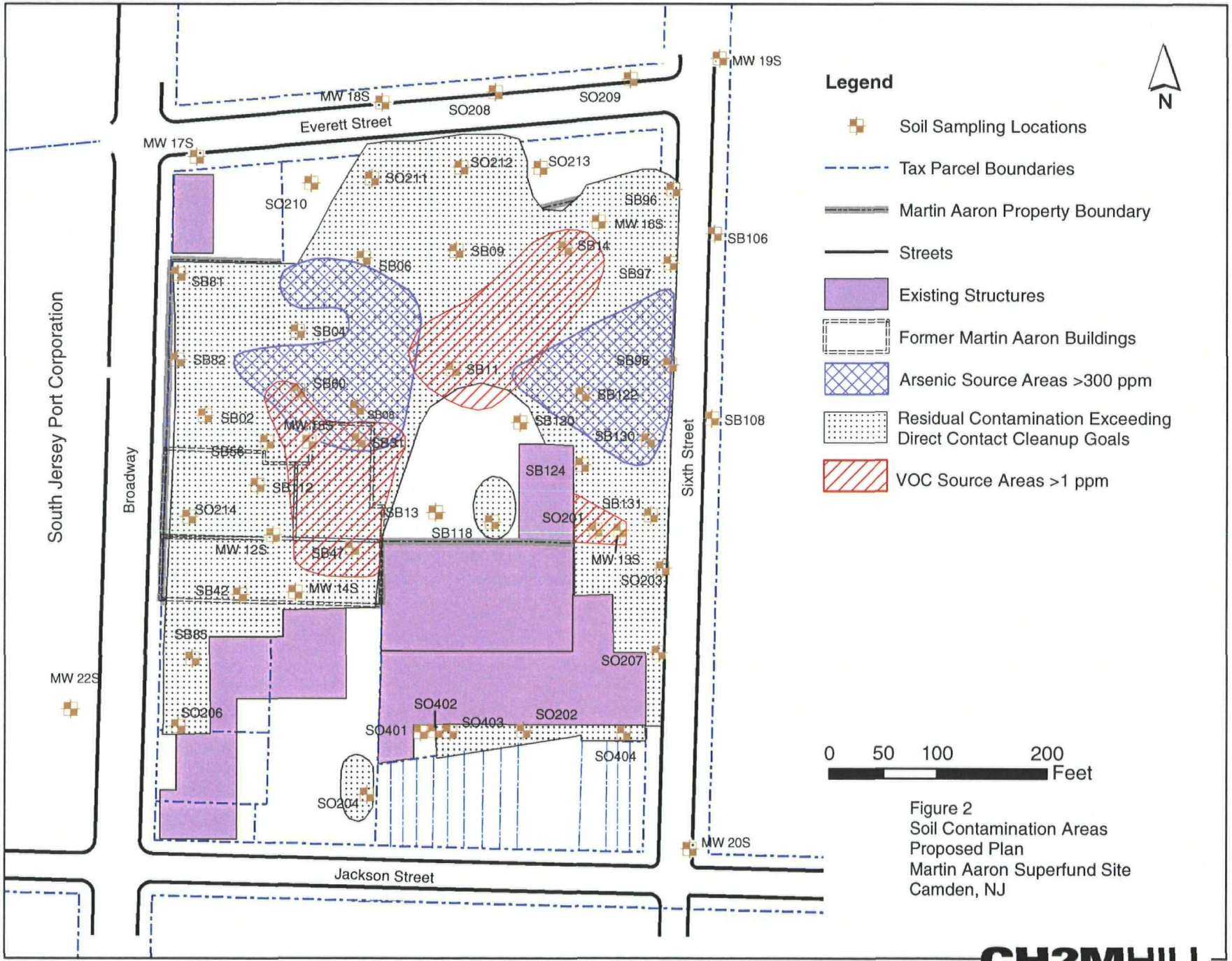

Figure 2
Soil Contamination Areas
Proposed Plan
Martin Aaron Superfund Site
Camden, NJ

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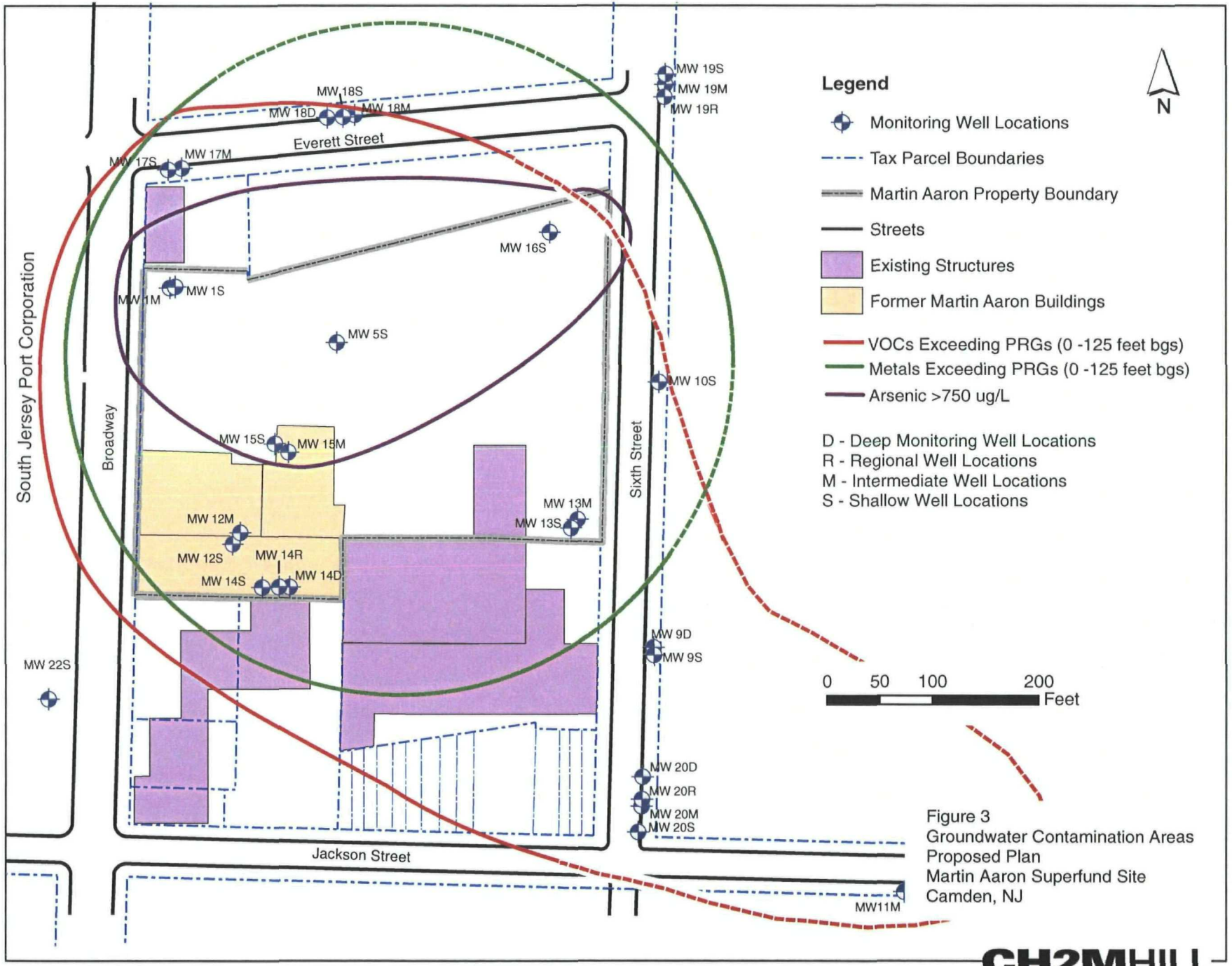

Figure 3
Groundwater Contamination Areas
Proposed Plan
Martin Aaron Superfund Site
Camden, NJ

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